

Challenges of Utilizing Satellite Precipitation Data for Hydrologic Applications

A Product Driven Proposal to the NEWS Challenge

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ABSTRACT

This product-driven proposal addresses the need for high-resolution precipitation data that is compatible both with research and applications. This need has been emphasized by NASA-ESE strategic plan, by various international research projects such as GEWEX, CLIVAR, and IGBP, and by the application community.

We respond to this by proposing a product-driven investigation that focuses on enhancing the capabilities of the Precipitation Estimation from Satellite Information using Artificial Neural Network (PERSIANN) system developed by our team. PERSIANN, is an adaptive, multi-platform precipitation estimation system, which uses artificial neural network methodology to merge high-quality, sparsely sampled data from multiple satellites. The system was developed with the goal of achieving an accuracy and spatio-temporal resolution suitable for hydrological research and applications. The proposed enhancements, will allow the system to produce a 10 years (1998-2008) high-resolution data set (reaching 4 km x 4 km 30 min), along with quantitative estimates of product quality and uncertainty.

To accomplish our goals, a research framework consisting of five elements is proposed. These are: (1) the PERSIANN system for precipitation retrieval from multiple satellites data, (2) quality monitoring and uncertainty assessment research, (3) multi-source (Satellite-gauge-radar) precipitation merging algorithm development activities, (4) investigation of product utility in model evaluation and data assimilation in predictive hydrologic and mesoscale models, and (5) a community based pilot study for intercomparison of high resolution precipitation products produced by our team and by other teams.

In addition to our University of California, Irvine (UCI) investigators, we have expanded our team to include Dr. Phillip Arkin of the University of Maryland, who brings in several decades of experience with remote sensing of precipitation, Dr. Eyal Amitai of NASA and George Mason University, who brings in expertise with validation of satellite precipitation using ground data, and Dr. Hoshin Gupta, of the university of Arizona, with expertise in system identification and parameter estimation. Our broadly based team is complemented by additional collaborators who represent a major data center (NESDIS), a forecasting agency (NWS), and two national research labs (LANL, LLNL). By partnering with these institutions, which are primary users of precipitation data (both for research and applications), the proposed products will be thoroughly evaluated throughout the investigation.